



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

Let $AD=a=29$, $BC=q=32$, $CD=c=40$, $DA=d=36$, $AC=BD=x$, $\angle DOA=\theta$. Project AD , BC , AC on BD .

$\therefore x=d\cos ADB+b\cos CBD+x\cos\theta$. Multiply through by $2x$ and write, $-\cos(ADB+CAD)$ for $\cos\theta$.

$\therefore 2x^2=2dx\cos ADB+2bx\cos CBK-2x^2\cos(ADB+CAK)$; $2dx\cos AKB=d^2+x^2-a^2$; $2bx\cos CBK=d^2+x^2-c^2=2dx\cos CAK$. Substituting,

$$2x^2=d^2+x^2-a^2+d^2+x^2-c^2-1/2d^2(d^2+x^2-a^2)(d^2+x^2-c^2) \\ +1/2d^2\sqrt{[4d^2x^2-(d^2+x^2-a^2)^2][4d^2x^2-(d^2+x^2-c^2)^2]}.$$

Reducing and collecting,

$$2x^6-(a^2+b^2+c^2+d^2)x^4+[a^2(b^2-2c^2+d^2)+b^2(c^2-2d^2)+c^2d^2]x^2 \\ +(ac-bd)(ac+bd)(a^2-b^2+c^2-d^2)=0.$$

Restoring numbers, $2x^6-4761x^4+317712x^2+2238016=0$.

$\therefore x=48.07$ nearly.

Also solved by LON C. WALKER, J. SCHEFFER, and D. B. NORTHRUP. Mr. Northrup's result agreed with Professor Zerr's and was obtained by the method of trial and error.

129. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

How high above the surface of the earth must an observer be elevated at the latitude $\phi(=39^\circ 19')$, the declination of the sun being $\delta(=23^\circ 27')$, in order to see the sun at midnight?

Solution by the PROPOSER.

The sun will be seen at midnight when the tangent drawn from the point to the earth strikes the sun when on the meridian at midnight. Denoting the required height above the earth by h , the radius of the earth by R , the latitude of the place by ϕ , and the declination of the sun by δ , we easily find $\sin(\phi+\delta)=$

$$\frac{R}{R+h}, \text{ whence } h=\frac{R[1-\sin(\phi+\delta)]}{\sin(\phi+\delta)}=\frac{2R\sin^2[45-\frac{1}{2}(\phi+\delta)]}{\sin(\phi+\delta)}.$$

For $\phi=39^\circ 19'$, $\delta=23^\circ 27'$, we get $h=495$ miles, nearly.

Also solved, with slightly different results, by G. B. M. ZERR, S. HART WRIGHT, and G. W. GREENWOOD.